CLAIMS

1. A method for diagnosing a predisposition for obesity, and in particular morbid obesity, in a human subject which comprises determining whether there is a germline alteration in the sequence of the 5' flanking region of the *gad2* gene, the coding sequence of which is represented by SEQ ID N° 1, wherein said alteration is the presence of at least one of the following mutations: -243 A>G at nucleotide 2137 of SEQ ID N° 2, -1.6kb G>A at nucleotide 780 of SEQ ID N° 2, -2004 A>T at nucleotide 376 of SEQ ID N° 2, said alteration being indicative of a predisposition to obesity.

2. The method of claim 1, wherein said obesity is morbid obesity.

3. A method for diagnosing a predisposition for obesity in a human subject, from a sample from said subject, wherein the level of an expression product of the *gad2* gene in said sample is investigated.

4. The method of claim 3, wherein said expression product is RNA or protein, or GABA.

5. The method of one of claim 1 to 4 further comprising a step consisting of detecting a protective haplotype for morbid obesity including alleles of SNP +61450 C>A, and +83897 T>A as depicted in SEQ ID No 16 and 17 respectively.

6. A primer or probe for detecting a predisposition for obesity selected from SEQ ID No 4 to 15.

7. A kit for detecting a predisposition for obesity comprising a set of primers or probes consisting of SEQ ID No 4, 5, 8, 9, 12 and 13 or a set of primers or probes consisting of SEQ ID No 6, 7, 10, 11, 14, and 15.

8. The kit according to claim 7 further comprising a primer or probe allowing detection of a protective haplotype consisting of 10 to 30 consecutive nucleotides of SEQ ID No 16 or 17 or of a sequence complementary thereof.

9. A method for screening potential obesity drugs which comprises: combining (i) a compound suspected of being an obesity drug, (ii) a GAD2 polypeptide and determining the amount of binding of the GAD2 polypeptide to said compound.

10. A method for screening potential obesity therapeutics which comprises: combining (i) a GAD2 binding partner, (ii) a GAD2 polypeptide and (iii) a compound suspected of being a obesity therapeutic and determining the amount of binding of the GAD2 polypeptide to its binding partner.

11. The method of claim 10, wherein said GAD2 binding partner is L-glutamic acid.

12. A method for screening potential obesity therapeutics which comprises: combining (i) a *gad2* gene binding partner, (ii) a *gad2* gene and (iii) a compound suspected of being a obesity therapeutic and determining the amount of binding of the *gad2* gene to its binding partner.

13. The method of claim 12, wherein said *gad2* gene binding partner is IK2 (Ikaros 2).

14. A pharmaceutical composition comprising a pharmaceutically acceptable excipient with a compound identified with the method according to any of claims 9 to 13.

15. Use of a compound identified with the method according to any of claims 9 to 13, or of a composition according to claim 14 for the preparation of a drug intended for treatment of obesity, in particular morbid obesity.

16. Use of an antisense molecule or SiRNA complementary to the *gad2* mRNA for the preparation of a drug intended for treatment of obesity, in particular morbid obesity.

17. The use according to claim 15 or 16 for the modulation of insulin secretion.

18. Use of a sense molecule comprising a fragment of the 5' flanking region of the *gad2* gene, especially comprising the -243 A>G variant (at nucleotide 2137 of SEQ ID N° 2), within said region, for the manufacture of a drug intended for the treatment of obesity.

19. A transgenic non-human mammal having integrated into its genome the nucleic acid sequence of *gad2*, or coding sequence thereof, operatively linked to regulatory elements, wherein expression of said sequence increases the level of the GAD2 protein and/or the GABA pool in said mammal relative to a non-transgenic mammal of the same species.

20. A transgenic non-human mammal whose genome comprises a disruption of the endogenous *gad2* gene, wherein said disruption comprises the insertion of a selectable marker sequence, and wherein said disruption results in said non-human mammal exhibiting a defect in GABA level as compared to a wild-type non-human mammal.

21. The mammal of claim 19 or 20 which is a mouse.

22. Use of a mammal according to any of claims 19 to 21, as a model for studying obesity, or for testing potential anti-obesity drugs.